REPAIR INSTRUCTION NO. RI-1078-93/1

1 Aircraft affected

G 115E / EG all as affected

2 Subject

ATA-Code: 57-50 Wings Trailing Edge Trailing Edge Devices
Repair of hinge bracket attachment points – FLAPS

3 Introduction

This Repair Instruction provides the instructions to accomplish the final repair for the flaps and flap attachment to wing as defined in MSB1078-205/2 and later revisions.
Revision 1 to remove the definition for the access holes, to provide additional information and to introduce the repair procedure in 7.3 for the contact surface of the hinge bracket attachment.

4 Concurrent Documents

Document No.	Rev. / Date	Title
115E AMM, Issue 2	Rev 8 or later	Grob G 115E Aircraft Maintenance Manual
1T-115E-4, Issue 2	Rev 0 or later	Grob G 115E Aircraft Illustrated Part Catalogue
1TG115EG-02-00GV-00-1	7 or later	Grob G 115EG Aircraft General Vehicle Manual
1TG115EG-3-00-00-1	7 or later	Grob G 115EG Structure Repair Manual
1TG115EG-5-08JG-00-1	3 or later	Grob G 115EG Aircraft Weight and Balance Manual
1TG115EG-4-00-00-1	8 or later	Grob G 115EG Aircraft Illustrated Parts Breakdown
MSB1078-205/2	Rev 2	Special Inspection Control Surface Hinge Bracket Attachment

5 Approval Note

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.030.

The associated repair design is approved under the authority of the DOA ref. EASA.21J.030.

6 Limitations

N/A

7 Repair / Instructions

Note:	The following instructions describe the repair for a single attachment point. The principal repair procedure is applicable for all attachment points. If a single attachment point is treated differently, it is stated in the instructions. The definition and location of the access holes is recommended by Grob only and must not be obeyed.

Note:	Each chapter and sub-chapter in the following instruction defines the curing process for a specific attachment point. If several locations are repaired at once these curing steps can be combined for the whole repair and must not be followed separately. The repair shall be cured at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13) before staring the initial cure. That will prevent the resin from dripping off the repair area. If that is secured, the curing time at room temperature can be adjused. Make sure to follow the curing cycle i.a.w. AMM Chapter 51-20 for the respective resin system. Nevertheless, the inner and outer repair can be post cured together, if the required temperature at the inner repair can also be reached.

Note:	In case of additional findings which are not covered in the following instructions or when in doubt, please contact Grob.

Note:	The AMM references in the following instructions are for the G 115E. For G 115EG use the relevant Job Guide.

7.1 Repair of Flap Hinge Bracket Attachment Points – Control Surface

7.1.1 Make the aircraft safe for parking, refer to AMM Chapter 10-10.
7.1.2 Remove the flap, refer to AMM Chapter 57-50.
7.1.3 Remove the affected hinge bracket from the flap. Discard the lock nuts.
7.1.4 Cut an access hole into the flap surface as small as practical.

Note:	If the access hole at location 7/12 is cut into the lower flap surface, it might be necessary to grind the upper shell locally for the installation of the bolts, refer to Figure 4.

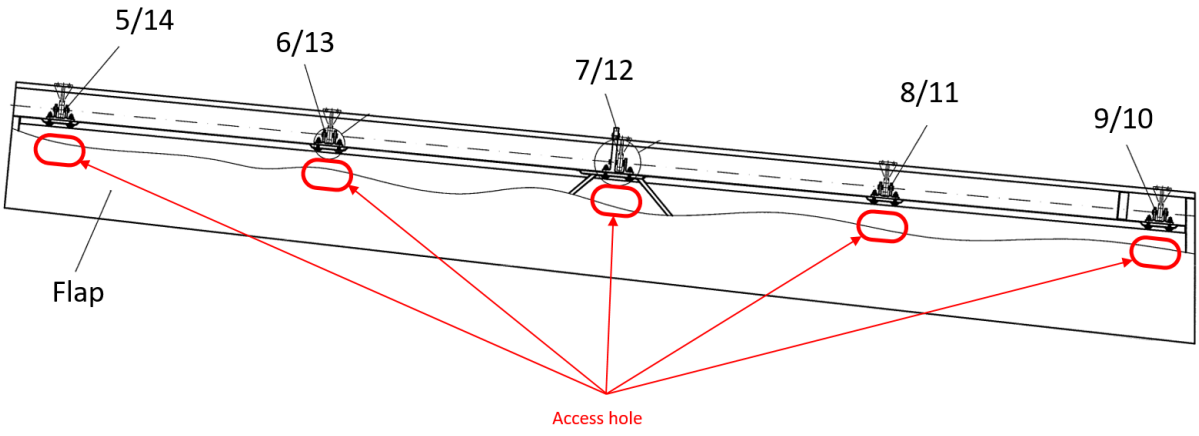

Figure 1: Flap Access Holes and Hinge Bracket Locations (LH shown, RH mirrored)

Table 1: Part Numbers Reference Table for Repair Location Flap

Location	P/N Repair Plate	P/N Bolt
5/14	115E-1263.06RI-0	115E-3103.01RI-0
6/13		
7/12	115E-1263.05RI-0	115E-1263.01RI-0
8/11	115E-1263.06RI-0	115E-3103.01RI-0
9/10		

CAUTION: At location 7/12 a 6mm thick repair plate (instead of 4mm) is installed with longer bolts of a higher strength category.

7.1.5 Remove all hinge bracket bolts and washers at the affected attachment point, refer to AMM Chapter 51-70. Discard the bolts and washers.

7.1.6 Carefully grind away the remaining resin and/or two part structural adhesive holding the bolt heads in position.

7.1.7 Carefully sand the repair area for the overlap repair.

7.1.8 If required, remove the damaged glass layer and plywood material around the bolt holes with a piloted counterbore, refer to Figure 2.

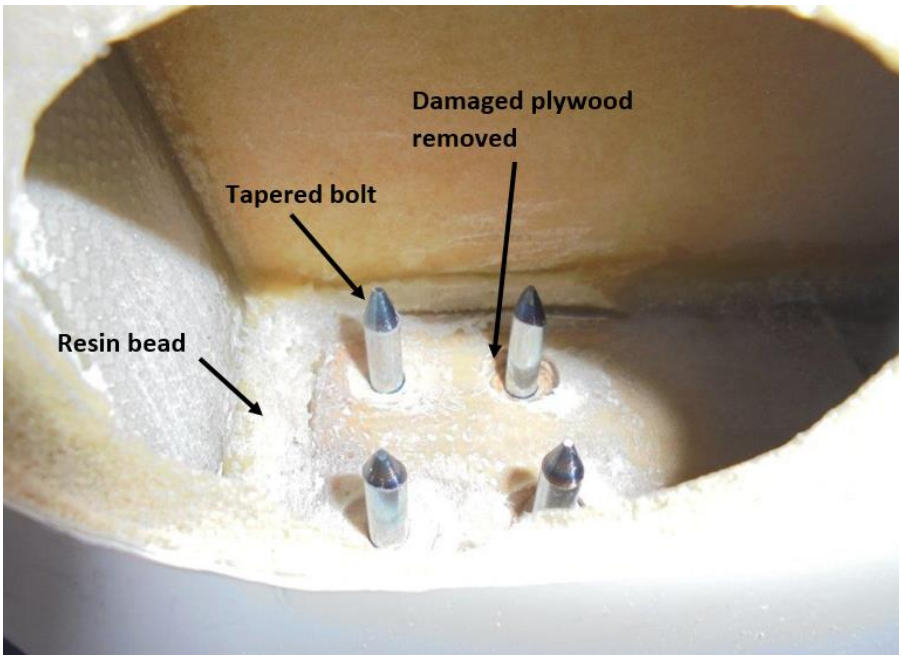

Figure 2: Insert damage removed and tapered bolts installed

7.1.9 If location 7/12 (refer to Figure 1) is repaired, pre-install the respective repair plate, washers and bolts to check if material from the inner shell has to be removed for the installation of the bolts. If required the inner shell can be grinded locally for installation of the bolts (refer to Figure 4). Remove the bolts, washers and repair plate after verification.

7.1.10 Remove the grinding dust with a vacuum cleaner.

7.1.11 Install four tapered bolts through holes in the spar. Wax the tapered bolts with release agent e.g. QZ5111 before installation. The tapered end must point to the inside of the flap, refer to Figure 2. Verify that the repair plate fits in the repair area properly. If required, trim the repair plate to fit. Refer to Figure 1 and Table 1 for the P/N of the Repair Plate.

7.1.12 If required, fill-out the holes where the damaged insert material was removed with thickened resin. Use GS510020-13 with 15-20% cotton flocks GS510060 and 2-3% Aerosil GS510063.

7.1.13 Cover the insert along the spar with two layers of glass fabric GS510031 ± 45°, refer to repair schematic in Figure 3.

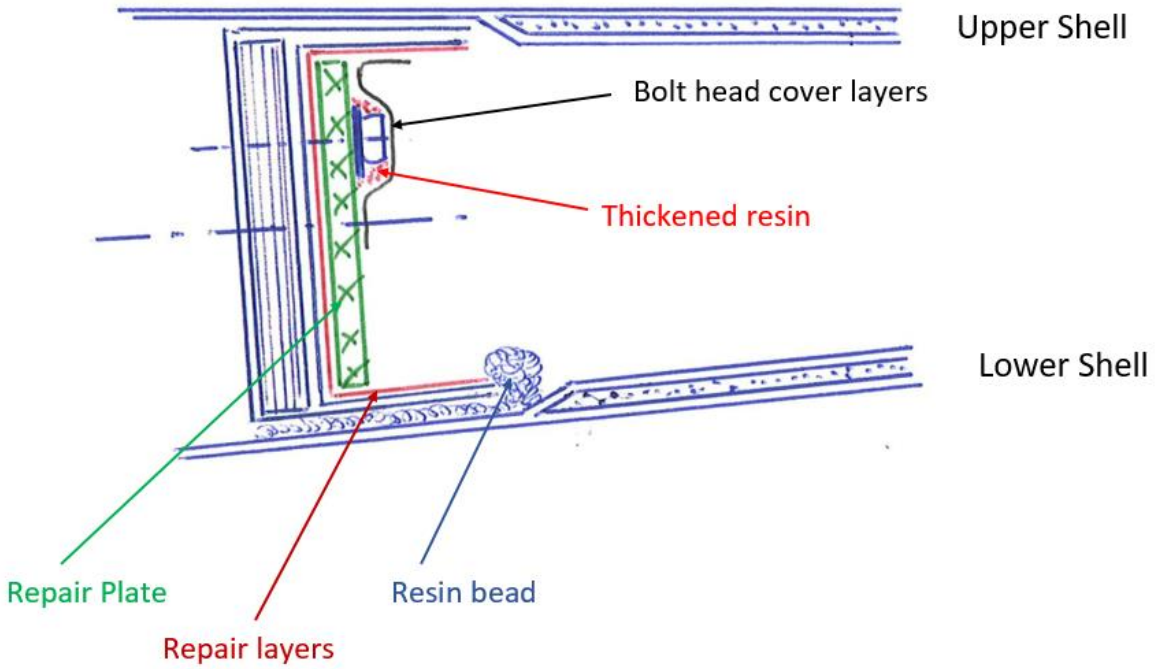

Figure 3: Repair schematic for locations 5/14, 6/13, 8/11 and 9/10

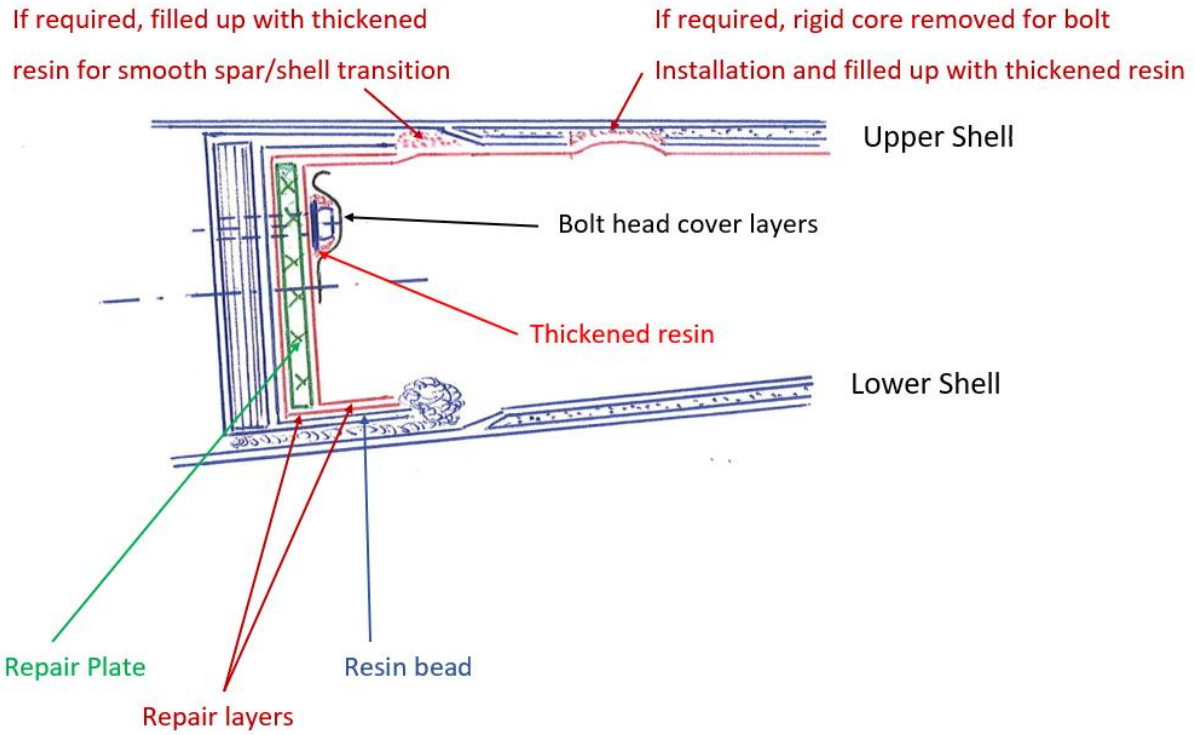

Figure 4: Repair schematic for location 7/12 sectional view

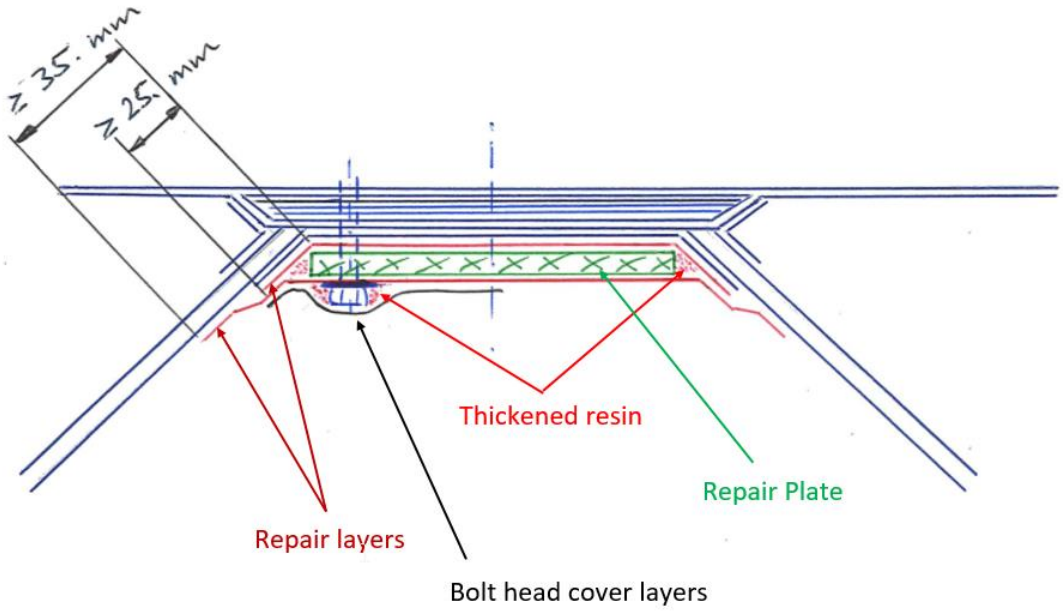

Figure 5: Repair schematic for location 7/12 top view

7.1.14 Remove the part number label from the respective repair plate. Make sure to remove any remaining adhesive of the part number label from the repair plate.

7.1.15 Apply thickened resin to the repair plate and to bonding area, refer to Figure 6.

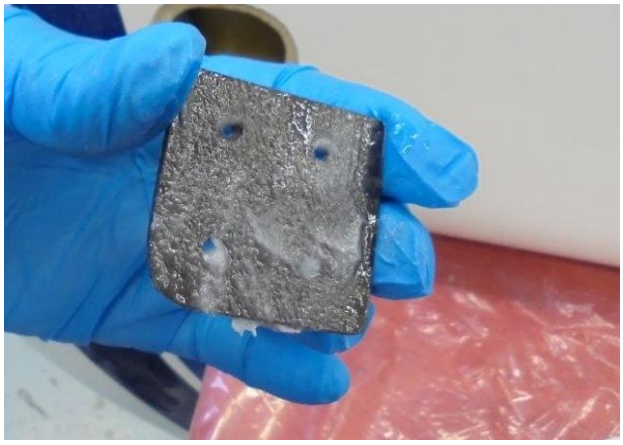

Figure 6: Thickened resin applied to CFRP repair plate

7.1.16 Bond the repair plate with the non-chamfered side through the tapered bolts on top of the repair. If required, smoothen out the excessive resin at the edges of the repair plate to gain a transition to the spar.

7.1.17 If the inner shell has been grinded locally at location 7/12 i.a.w. step 7.1.9, fill the grinded area with thickened resin If required fill up the spar/shell transition with thickened resin for a smooth overlap repair (refer to Figure 4 and Figure 5).

7.1.18 If Location 7/12 is repaired, cover the repair plate with two additional layers of glass fabric GS510031 ± 45°, refer to Figure 4 and Figure 5.

7.1.19 Remove the tapered bolts.

7.1.20 Install four washers (item 5 of List 9) and four bolts (refer to Table 1 for the P/N of the bolts), refer to Figure 7. If required, clean the thread of the bolts from resin.

Figure 7: Bolts and washers installed

7.1.21 Re-install the removed hinge bracket to the leading edge rib with the previously removed washers and standard M5 nuts. Tighten the nuts by hand just to keep the bolts heads and washers in position. If required, the length of the bolts shall be adjusted by additional washers under the nut, refer to IPC.

7.1.22 Apply thickened resin around the bolt heads and washers and cover the repair with two layers of glass fabric GS510031 ±45°, refer to Figure 8.

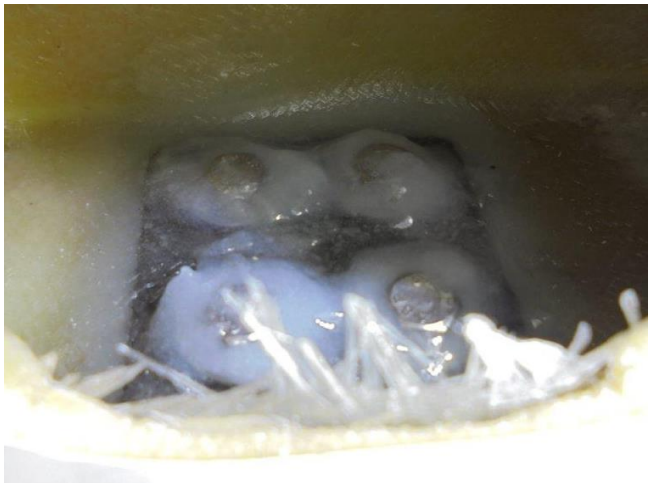

Figure 8: Thickened resin around bolt heads and washers with covering layers of glass fabric

7.1.23 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.

7.1.24 Close the access hole and do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.

7.1.25 Paint the repair area, refer to AMM Chapter 51-20.

7.1.26 Replace the four standard M5 nuts with four self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).

7.1.27 Do a control surface balancing, refer to AMM Chapter 51-60.

7.1.28 If required, install the flap, refer to AMM Chapter 57-50.

7.2 Repair of Flap Hinge Bracket Attachment Points – Wing

7.2.1 Make the aircraft safe for parking, refer to AMM Chapter 10-10.
7.2.2 Remove the flap, refer to AMM Chapter 57-50.
7.2.3 Remove the affected hinge bracket from the wing. Discard the lock nuts.
7.2.4 If required, cut an access hole into the wing surface as small as practical.

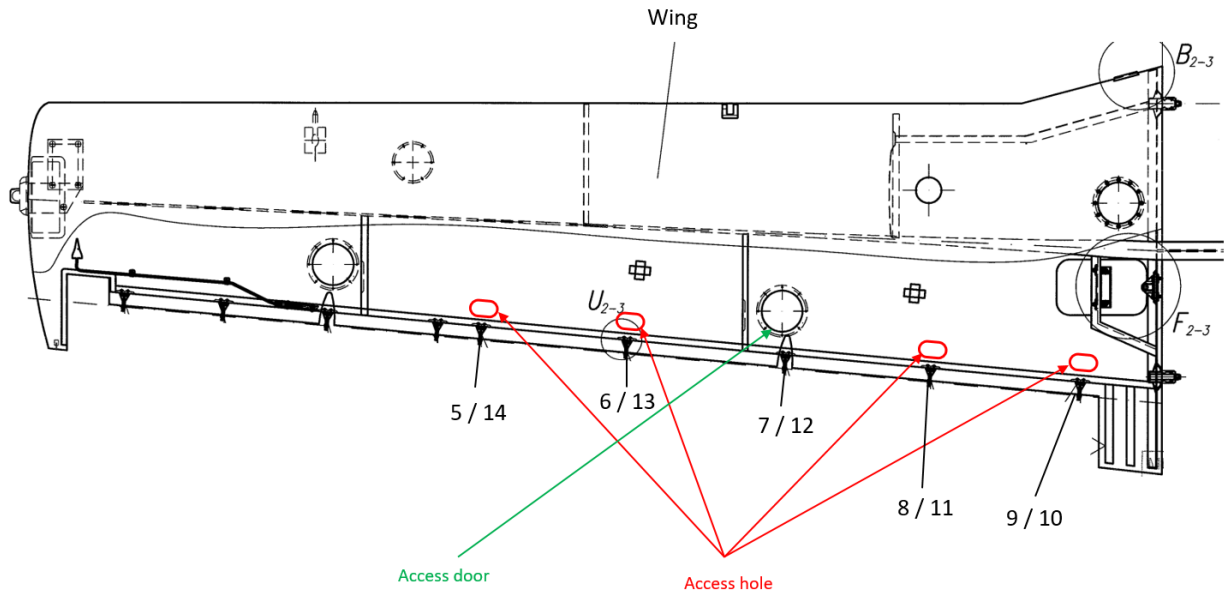

Figure 9: Wing Access Holes and Hinge Bracket Locations (LH shown, RH mirrored)

Table 2: Part Numbers Reference Table for Repair Location Wing

Location	P/N Repair Plate	P/N Bolt
5/14	115E-1071.01RI-0	115E-3103.01RI-0
6/13	115E-1071.02RI-0	
7/12	115E-1071.03RI-0	
8/11	115E-1071.04RI-0	
9/10	115E-1071.05RI-0	

7.2.5 Remove all hinge bracket bolts and washers at the affected attachment point, refer to AMM Chapter 51-70. Discard the bolts and washers.
7.2.6 Carefully grind away the remaining resin and/or two part structural adhesive holding the bolt heads in position.

Note:	Lightning protection sheets are installed at locations 8/11 and 9/10. If you repair location 8/11 the lightning protection sheet remains installed and the repair plate is installed to the side without lightning protection. Only the bolts are removed from the lightning protection strip and replaced with bolts (item 2 of List 9) and washers (item 5 of List 9). If a damaged lightning protection sheet has caused an additional damage to the plywood sandwich below, please contact Grob.
Note:	If you repair location 9/10 the lightning protection sheet is bended away for the repair of the insert.

7.2.7 Carefully sand the repair area for the overlap repair.
7.2.8 If required, remove the damaged carbon layers and plywood material around the bolt holes with a piloted counterbore, refer to Figure 2.
7.2.9 Remove the grinding dust with a vacuum cleaner.
7.2.10 Install four tapered bolts through holes in the spar. Wax the tapered bolts with release agent e.g. QZ5111 before installation. The tapered end must point to the inside of the wing, refer to Figure 2. Verify that the repair plate fits in the repair area properly. If required, trim the repair plate to fit (Refer to Figure 9 and Table 2 for the P/N of the Repair Plate.
7.2.11 If required, fill-out the holes where the damaged insert material was removed with thickened resin. Use GS510020-13 with 15-20% cotton flocks GS510060 and 2-3% Aerosil GS510063.
7.2.12 Cover the insert along the spar with carbon fabric GS510040 ± 45°. Use four layers on location 7/12 (stagger the layers in span wise direction) and two layers on the other locations.
7.2.13 Remove the part number label from the respective repair plate. Make sure to remove any remaining adhesive of the part number label from the repair plate.
7.2.14 Apply thickened resin to the repair plate and to bonding area, refer to Figure 6.
7.2.15 Bond the repair plate with the non-chamfered side through the tapered bolts on top of repair. Smoothen out the excessive resin at the edges of the repair plate to gain a transition/chamfer to the spar.
7.2.16 Remove the tapered bolts.
7.2.17 Install four washers (item 5 of List 9) and the four bolts (item 2 of List 9), refer to Figure 7. If required, clean the thread of the bolts from resin.
7.2.18 Re-install the removed hinge bracket to the trailing edge rib with the previously removed washers and standard M5 nuts. Tighten the nuts by hand just to keep the bolts heads and washers in position. If required, the length of the bolts shall be adjusted by additional washers under the nut, refer to IPC.
7.2.19 Do a bonding check, refer to AMM 51-80.
7.2.20 Apply thickened resin around the bolt heads and washers and cover the repair with two layer of carbon fabric GS510040 ±45°.
7.2.21 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
1.1.1 Replace the four standard M5 nuts with four self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).
7.2.22 If required, close the access door and do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.
7.2.23 If required, close the access hole and do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.
7.2.24 If required, paint the repair area, refer to AMM Chapter 51-20.
7.2.25 Replace the four standard M5 nuts with four self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).
7.2.26 Install the flap, refer to AMM Chapter 57-50.

7.3 Repair of contact surface of hinge bracket attachment

Note:	The following instructions are only applicable for an uneven surface at the hinge bracket attachment points with a maximum gap of 0.3mm i.a.w. MSB-1078-205/3 or later. If any kind of damage to the laminate is evident or the height of the gap exceeds a maximum of 0.3mm, please contact Grob.

7.3.1 If required, make the aircraft safe for parking, refer to AMM Chapter 10-10.
7.3.2 If required, remove the flap, refer to AMM Chapter 57-50.
7.3.3 If required, remove the affected hinge bracket from the flap / wing. Discard the lock nuts.
7.3.4 Carefully sand the repair area
7.3.5 Fill up the gap with GS510109. Level the adhesive with a spatula. Let the adhesive cure according to manufacturer's instruction.
7.3.6 If required, grind the adhesive level with the spar.
7.3.7 Install the removed hinge bracket with the previously removed washers and new self-locking nuts item 6 of List 9.
7.3.7.1 If the hinge bracket attachment point has been repaired i.a.w. 7.1 or 7.2, torque the self-locking nuts with 3.6Nm plus safety torque (friction torque or braking torque).
7.3.7.2 If the hinge bracket attachment point has **not** been repaire i.a.w. 7.1 or 7.2, torque the self-locking nuts with 1.5Nm plus safety torque (friction torque or braking torque).
7.3.8 Install the flap, refer to AMM Chapter 57-50.

8 Weight and CG

Do a control surface balancing, refer to AMM Chapter 51-60.
Do a weight and balance, refer to AMM Chapter 08-10.

9 Material and Availability

Item	P/N	Description	Qty. per A/C
1	115E-1263.01RI-0	Bolt	8
2	115E-3103.01RI-0	Bolt	72
3	115E-1263.05RI-0	Repair Plate	2
4	115E-1263.06RI-0	Repair Plate	8
5	DIN9021-A2-5.3	Washer	AR
6	LN9348-05	Self-Locking Nut	80
7	115E-1071.01RI-0	Repair Plate	2
8	115E-1071.02RI-0	Repair Plate	2
9	115E-1071.03RI-0	Repair Plate	2
10	115E-1071.04RI-0	Repair Plate	2
11	115E-1071.05RI-0	Repair Plate	2

For further repair material, refer to AMM Chapter 51-30

Table 3: Cross Reference List Fiber Materials

P/N Grob	P/N (Manufacturer)	Description
GS510030	92110 (P-D Interglas Technolgies GmbH); 917 (Porcher Industries)	Glass Fiber Fabric Twill 2/2, 163 g/m^2
GS510031	92125 (P-D Interglas Technolgies GmbH); 3063 (Porcher Industries)	Glass Fiber Fabric Twill 2/2, 280 g/m^2
GS510040*	98141 (P-D Interglas Technolgies GmbH); 3692 (Porcher Industries) 452 (C. Cramer, Weberei, GmbH & Co. KG) KDK 8042 (SGL CARBON GmbH)	Carbon Fiber Fabric Twill 2/2, 204 g/m^2
GS518002	459 (C. Cramer, Weberei, GmbH & Co. KG)	Carbon Fiber Fabric + Alu Mesh for Lightning Protection

***HTA Fiber!**

10 Special Tools

Tapered Bolts

11 Appendices

N/A

12 Accomplishment

The instructions in paragraph 7 have to be accomplished and certified in the logbook by authorized staff:

- in EASA countries according to EASA Part 66
- in non-EASA countries according to national regulations with respect to maintenance.

13 Contact

For questions and assistance or in case of occurrence please contact:

Product Support,
phone: +49 8268 998105
fax: +49 8268 998200
e-mail: productsupport@grob-aircraft.com